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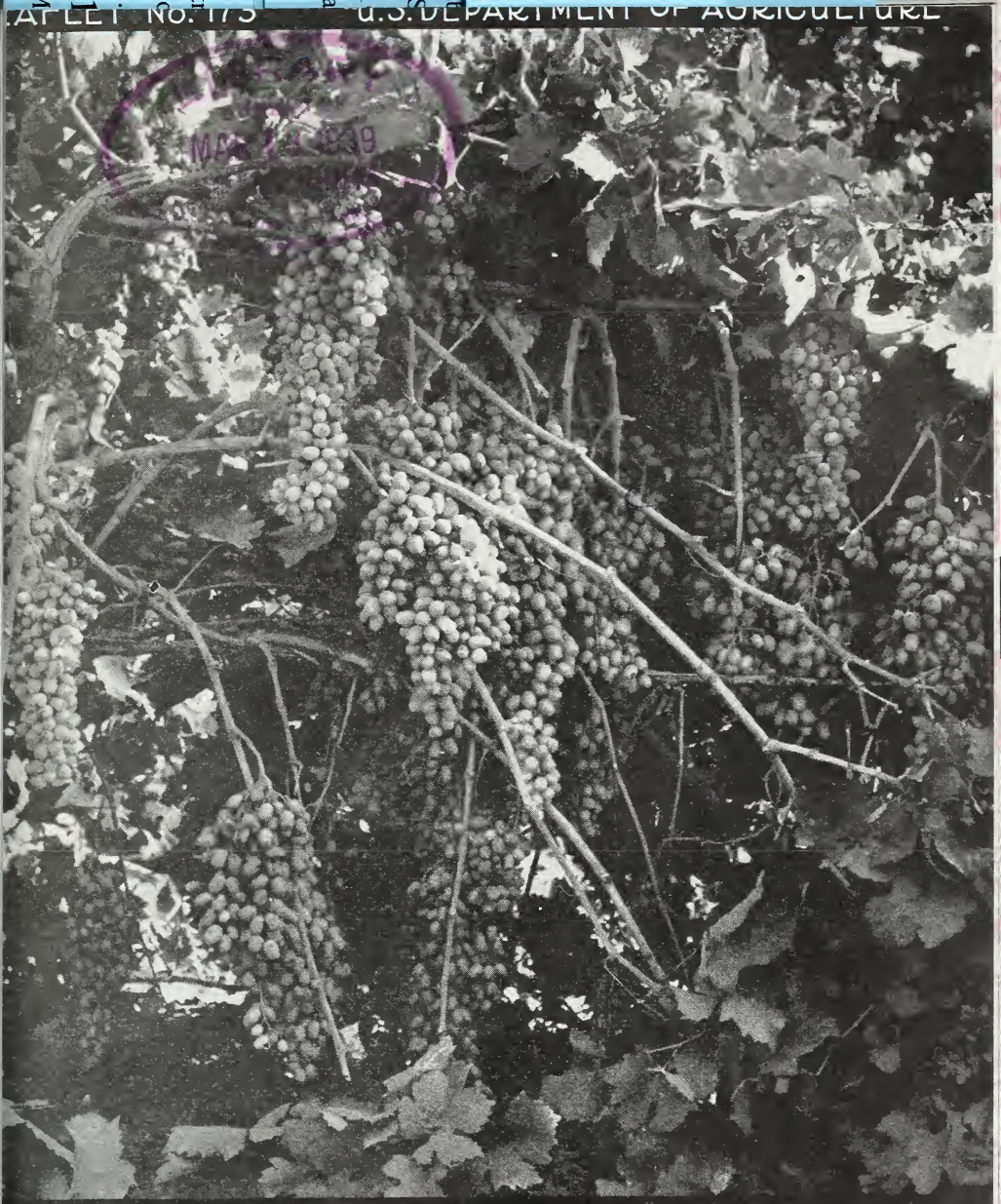

The BUD-GRAFT METHOD OF PROPAGATING VINIFERA GRAPE VARIETIES ON ROOTSTOCKS

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The growing of *Vitis vinifera* varieties of grapes on their own roots in the older grape districts of California is becoming extremely hazardous because of the possibility of infestation by phylloxera (*Phylloxera vitifoliae* Fitch) and the root knot nematode (*Heterodera marioni* (Cornu) Goodey). To overcome these pests, the desired vinifera varieties can be grafted on rootstocks resistant to both phylloxera and root knot.

The bud-grafting method is one of the more popular means of establishing vinifera vineyards on grape rootstocks. The bud graft as applied to grapes differs from the budding of other fruits in that along with the grape bud a considerable amount of woody tissue is also included. The method described in this leaflet has been used satisfactorily in the Federal experiment vineyards in California for more than 15 years. It can also be adapted to other sections in establishing grapes on rootstocks.

Planting the Rootstock

In California the grape rootstocks are usually planted during February and March. Previous to field planting, the stock rootings are pruned by cutting off all side rootlets and leaving the basal roots 4 to 6 inches long. All buds are removed from the stump or original cutting of the rooting to prevent the growth of stock suckers. The top shoot growth of the rooting is pruned back to one or more spurs of two buds each. The rootstock should be planted so that 2 to 3 inches of the root stump or portion of the original stock cutting is above the soil level. This portion of the original cutting left above ground furnishes a suitable place to later insert the vinifera scion bud. Soil is worked toward the stock vine to keep this portion of the stump protected from drying during the summer months.

Selection of Scion Buds

The scion buds should be selected from the current season's growing shoots that show maturity by the brown coloring of both the wood and buds. Since grape mutations, or offtypes, are known to occur, the buds should be selected from vines or shoots bearing fruit that is characteristic of the desired vinifera variety. When convenient, scion bud sticks should be cut fresh several times a day during the budding operations. If this is not possible and it is necessary to cut a supply of bud sticks prior to the budding, they should be carefully protected from drying.

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Bud-Grafting Operation

The bud-grafting operation may be started during early August in the cooler coastal sections and about mid-August in the interior valleys in California and can be continued successfully until late September or later in the more favorable seasons. While the extreme time limits during which the bud grafting can be successfully made have not been determined, these limits will vary with seasonal and local conditions.

In the actual bud-grafting operation (figs. 1 and 2), a smooth place is selected on the stock slightly above the soil level. The scion bud,

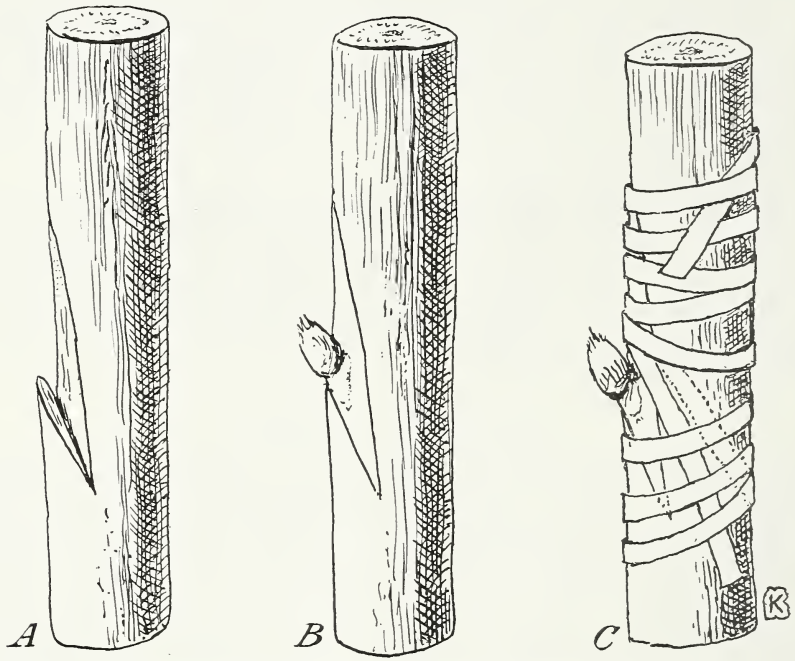

FIGURE 1.—Summer bud grafting: *A*, Cut made in stock for the bud; *B*, bud placed in position on stock; *C*, bud wrapped in place.

located at this place, is not likely to develop roots. An oblique downward cut is made on the stock ¾ to 1 inch in length (fig. 1, *A*) and a shorter cut is made into the stock at an acute angle meeting the first cut at its basal end. The chip thus made is removed from the rootstock. By similar cuts on the vinifera budstick, making the second oblique cut just below the base of the scion bud, a chip of wood including the bud is obtained. This scion bud chip should be similar in size to the chip removed from the rootstock. The chip bud thus obtained is fitted tightly into the rootstock (fig. 1, *B*) with as much of the cambium layers of the bud and the stock coinciding as is possible. The bud chip is held firmly in place by wrapping with a suitable tying material (fig. 1, *C*, and 2, *C*). Thin rubber grafting tape one-eighth inch wide can be obtained and is commonly used for this purpose. The budded portion of the stock is then covered with 6 to

8 inches of moist soil to protect the bud thoroughly until the following spring (fig. 2, *D*). The stock is not cut off in the fall but is allowed to continue growth the rest of the growing season. The bud, covered with soil, unites with the stock during the fall but does not grow until the following spring. The stock vines may be pruned during the dormant season to get rid of excess brush.

FIGURE 2.—Drawings illustrating bud-grafting operations in the fall: *A*, Stock with the wood chip removed; *B*, scion bud chip inserted; *C*, scion bud chip wrapped in place; *D*, completed bud graft covered with soil.

Spring Care of Budded Vines

When the stock vines start growth in the spring, as in figure 3, *A*, the mound of soil which has covered the buds during the fall and winter months is removed. The stock is cut off about 1 to 2 inches above the bud chip (fig. 3, *B*), care being taken not to injure the bud or bud chip. Scion roots that may be growing from the bud

chip are carefully trimmed off at this time. The rubber tying material is cut below the bud, allowing the top strands to hold the top end of the bud chip in place. The budded portion is again covered with loose soil to a depth of 1 to 2 inches to protect the bud and stock union from drying. In heavy soils a small roll of heavy paper about 6 inches high is placed around the budded vines (fig. 3, *C*), and coarse

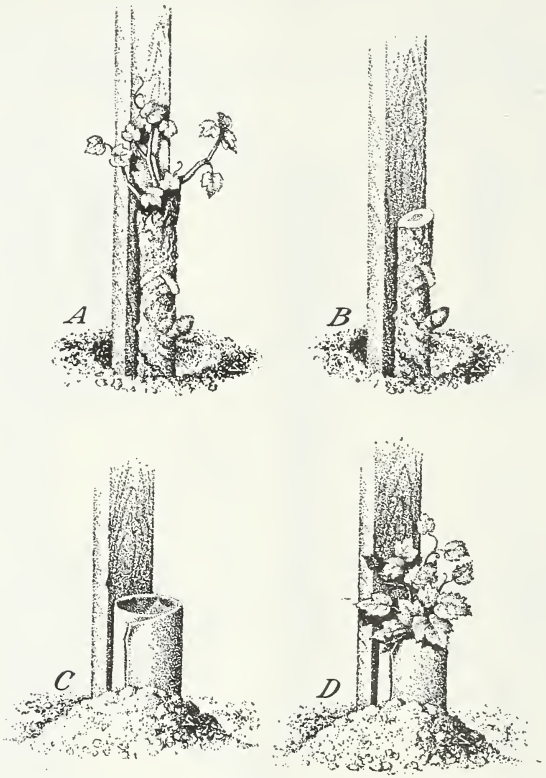

FIGURE 3.—Spring care of bud-grafted vine: *A*, The mound of soil removed after growth has started; *B*, stock cut off above the vinifera bud; *C*, stock and bud surrounded by a roll of heavy paper; and *D*, growth from bud tied to a stake.

sand is placed inside the paper roll to a depth of 1 to 2 inches over the budded portion of the rootstock. This procedure prevents the soil from hardening and permits a straight shoot to develop from the scion bud. As the shoot develops rapidly in the spring frequent tying and training to a stake (fig. 3, *D*) is necessary. If care is used in the various operations, at least 90 percent of the buds should grow. The rootstocks on which the buds fail to grow can be spring-grafted or bud-grafted the following fall.

Training the Vinifera Growth

Several shoots (fig. 4, *A*) may develop from the vinifera bud. After these shoots have developed 8 to 10 inches it is desirable to take off all but the most vigorous one, leaving a straight shoot (fig. 4, *B*) to form the permanent trunk of the vine. A straight trunk with the proper height of head can be established during the first summer's growth of the vinifera bud. Summer training will depend on the form of vine and the trellis system desired. The bud unions should be inspected yearly in order to remove any scion roots that may have grown. Figure 4, *C*, illustrates the growth of scion roots on a young bud-grafted vine, and figure 4, *D*, shows the same vine with the scion roots cleanly removed.

Age of Bearing

Vinifera varieties budded on rootstocks will come into bearing practically as soon as vines on their own roots. A small amount of fruit may be produced on lateral growth the second summer after the rootstock was planted. At the end of the second season the vines can usually be pruned to several spurs or short canes, depending on the type of pruning for the variety. There will be a small crop

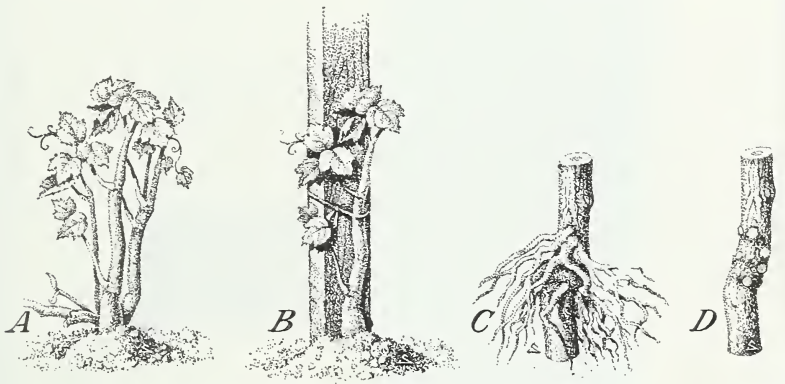

FIGURE 4.—Summer care of bud grafts: *A*, Several shoots growing from a vinifera bud graft; *B*, thinned to one main shoot which is tied up to a stake; *C*, scion roots growing from the base of the stem that developed from the bud chip; *D*, scion roots cleanly removed.

the third summer, and a normal crop may be expected during the fourth year. The illustration on the cover page shows a vinifera variety, budded on a rootstock, which produced 100 pounds of fruit during the sixth season from the time the stock was planted.

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